Distribution of n-alkan-2-ones in Qionghai Lake sediments,southwest China, and its potential for paleoclimate reconstruction

GEN WANG[1], YONGLI WANG[2], ZHIFU WEI[1], YAN LIU[1]

[1]Key Labortory of Petroleum Resources Research, Gansu Province, Northwest Institute of Eco-Environment and Resources, Chinese Academy of Sciences, Lanzhou 730000, China

[2]Key Laboratory of Cenozoic Geology and Environment, Institute of Geology and Geophysics, Chinese Academy of Sciences; CAS Center for Excellence in Life and Paleoenvironment, Beijing 100029, China

Reconstructions of climate evolution history since the Last Glacial Maximum can offer significant background information not only for better understanding of present processes of modern climate, but also for prediction of future climate changes. Studies on long-chian n-alkan-2-ones from lake sediments remain sparse. In this study, we presented a n-alkan-2-one record in the Qionghai Lake sediments from southwest China, to assess the paleoclimate significances of variations in their compositions during the past 28 cal ka BP. A homologous series of n-alkan-2-ones ranging from C21 to C35 were identified through the core sequence, maximizing at C29 or C31 and displaying a strong odd-over-even predominance. This type of n-alkan-2-one distribution is considered to mainly derive from microbial oxidation of the corresponding n-alkanes, as well as partial inputs from plants. In addition, we compared our n-alkan-2-one proxies with previously published n-alkane indexes and grain size characteristics from the same core sediments, aiming to evaluate the applicability of n-alkan-2-ones as effective paleoclimate indexes. The results indicate that paleoclimate conditions recorded by the n-alkane proxies and grain size fractions are also archived in the n-alkan-2-one derived ACL and CPI values. Especially, during the well-documented climate events including the Last Glacial Maximum, Heinrich 1 event, Younger Dryas and Holocene Climatic Optimum, variations of n-alkan-2-one derived CPI and ACL values exhibited significant fluctuations, generally in response to these climate shifts. Therefore, n-alkan-2-ones display great potentials as a paleoclimate proxy and can be applied in conjunction with other biomarkers to reconstruct a reliable paleoclimate and paleoenvironment record in lake sediments.